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Journal
Journal of California and Great Basin Anthropology, 6(2)

ISSN
0191-3557

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Publication Date
1984-07-01

Peer reviewed

Journal of California and Great Basin Anthropology
Vol. 6, No. 2, pp. 217-224 (1984)

Late Prehistoric Microblade Manufacture in San Diego County, California

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A widely accepted indication of efficient, sophisticated stone tool technology is the production and use of blade flakes. With a few isolated exceptions in the northern Channel Islands and the adjacent Santa Barbara coastal area, such technology has not been attributed to southern California Indians (Curtis 1964; Heizer and Kelley 1962; King 1971; Kowta 1961; Laguna 1947: 172; Pitzer et al. 1974; Swartz 1959, 1960). It is the contention of this article that blade manufacturing was more widespread in southern California and, in fact, reached at least as far south as northern San Diego County among late prehistoric peoples.

Before considering the evidence for this contention, it is of value to review blade technology briefly. A blade is a specialized flake with roughly parallel lateral edges, an overall length that is at least twice the width, and a cross section that may be triangular, trapezoidal or, more rarely, plano-convex or rectangular (Crabtree 1982: 16). Blades are standardized forms produced from prepared cores. The repeated uniformity of these delicate forms precludes their being produced randomly by fortuitous percussion blows on amorphous (i.e., irregular) shaped cores. Without further modification, blades make exceptionally sharp cutting and scraping tools. They are also standardized blanks for the manufacture of burins, backed knives, drills, specialized scrapers, and microliths.

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Blades vary in length from up to 18 cm. for many Mesoamerican specimens to less than 4 cm. for most North American Arctic varieties. For the purpose of the present discussion, microblades are being distinguished from macroblades on the basis of having lengths of 5 cm. or less. This length appears to be the upper limit of virtually all of the southern California blades described in the published literature.

Blade manufacture may be deduced from an archaeological assemblage if it contains numerous examples of (1) blades, (2) blade cores, and (3) diagnostic by-products of the core preparation. The mere presence of a few blades would not be conclusive evidence of local blade production since they could be trade items. This caution would be especially warranted in southern California if the blades were made from high grade, imported lithic material such as isotropic obsidian. The presence of spent blade cores and by-products of the core preparation would be more conclusive evidence of local blade production due to the greater likelihood that they would have been defined as waste material of little value and, therefore, not probable trade items.

Blade cores may be of many types. However, they are most often extensively worked regular polyhedrals with roughly parallel, narrow flake scars resulting from blade removal. In the most common forms, which are cylindrical or conical, cores require three preparatory steps prior to blade removal

(Crabtree 1982: 21, 41). First, a planar (i.e., dished) striking platform is created at one end of an oblong core by a heavy percussion blow. Second, a longitudinal ridge is produced by lighter, alternate percussion blows lateral to the core axis. This ridge is intended to guide the removal of a crested blade (also known as lamé a crete) in the third step. This is usually done by pressure flaking or indirect percussion with a punch and percussor. The crested blade is a long, narrow flake with a triangular cross section and a dorsal side covered with bi-directional flake scars meeting at the longitudinal ridge. The side opposite the ridge has the smooth ventral surface of a single flake, usually with concoidal fracture rings emanating from one end. The detachment of the crested blade leaves two roughly parallel, longitudinal ridges on the core which can be used to guide the removal of standard blade flakes. Each subsequent blade removal produces two more roughly parallel ridges so that blades can be detached sequentially around the core until it shatters or becomes too small to continue. Occasionally, a new striking platform is produced by a heavy lateral percussion blow that removes the old, useless platform and, at the same time, creates a new one. The rejuvenation flake that is removed in this process is roughly disk-shaped and tabular, with more or less parallel flake scars on its rim from blade removal when it was still a part of the core.

MICROBLADES FROM THE NORTHERN CHANNEL ISLANDS AND THE ADJACENT COASTAL AREA

Pitzer et al. (1974: 129-132) report that on Santa Cruz and Santa Rosa Islands in the northern Channel Island group, microblades were mostly produced from subconical, polyhedral cores or large flakes. In both cases, the microblade removal was essentially the same as the generalized description above with slight variations. The large flake type of core sometimes had a multi-faceted striking platform. A third, rare type of core is also a large flake but differs from the others in that microblades were removed bi-directionally. Both of the large flake type cores described by Pitzer et al. (1974: 131) characteristically were used only slightly, exhibiting but one or two microblade flake scars. Swartz (1960: 406) reports that microblades have also been found on San Miguel and Anacapa Islands. A cylindrical microblade core prepared with a striking platform was found on West Anacapa Island (McKusick 1959: Fig. 3).

Kowta (1961: 351-358) found essentially the same core forms and additional types in the SBA-60 assemblage from Goleta, on the Santa Barbara coast. He carefully defines thirteen types of cores used to produce microblades:

1. single platform polyhedral [with a few being sub-conical]
2. single platform triangular [with a quadrilateral cross section]
3. double platform triangular
4. bi-planar polyhedral [Kowta uses the term planar to refer to striking platforms that are perpendicular to the core axis]
5. bi-bevel polyhedral [bevel refers to striking platforms that are at an angle approaching 60° to the core axis]
6. plano-bevel polyhedral
7. tabular [i.e., with a sub-rectangular cross section]
8. bevelled tabular
9. squamosal flake [i.e., "relatively broad, flat flakes wedge-shaped or plano-convex in cross section . . . with a platform which extends across the entire top of the flake"]
10. prismatic flake
11. lamellar flake [i.e., long with a thin, flat cross-section]
12. elongate polyhedral

13. miscellaneous flake [i.e., irregular forms]

Slightly over 42% of the 409 microblade cores from SBA-60 are lithic blocks rather than flakes, though the distinction between the two forms does not seem to be clear-cut in some cases. Kowta (1961: 352) summarizes his analysis by stating that "polyhedral or triangular [cores] are adapted to the production of relatively flat prismatic blades and nonprismatic flakes, whereas the tabular and flake varieties are especially suited for the manufacture of small, more nearly equiangular [prismatic] blades."

MICROBLADES FROM NORTHERN SAN DIEGO COUNTY

During the 1977-1980 excavations of site W-1556 (San Diego Museum of Man designation) (CA-SDI-5641) in northern San Diego County, sufficient evidence was found to demonstrate that there was local microblade production (O'Neil 1982). The site was a seasonal camp for the exploitation of spring and early summer biotic resources in the San Marcos Valley primarily from the late 16th to early 19th centuries A.D.

The excavation of W-1556 produced 161 microblades of which 42 were utilized for casual cutting and/or scraping without further intentional modification and 11 were retouched for use as scrapers and scraper-graver combinations. The remaining 108 do not show evidence of having been used for cutting or scraping nor have they been retouched. None of the microblades was modified for use as a microdrill as was often the case at SBA-60, Santa Cruz, and Santa Rosa Islands (Kowta 1961: 360-361; Pitzer et al. 1974: 132-133). There are two crested blades and seven platform cores prepared for microblade removal. Microblades are a minority of the entire assemblage since they represent only 0.2% of the nonutilized flakes, 6.0% of the flakes utilized for casual scraping without further modification, and 14.1% of the retouched flake scrapers. As pointed out earlier, however, the presence of crested blades and blade cores tends to indicate local manufacture at W-1556 rather than importation. Caution precludes jumping to the conclusion that this technology was widespread in northern San Diego County.

The W-1556 microblades have a length to width ratio range of 2:1 to 4:1 (Fig. 1a, b, d, and e). The sides are roughly parallel and the cross sections are triangular (92.1%) or, more rarely, trapezoidal (7.9%). For comparative purposes, the microblades were subdivided into three size categories (Table 1) which were derived from the slightly trimodal distribution of length frequencies. These data suggest that larger microblades were the preferred size for flake scrapers. Whether or not the microblade makers were adept enough to produce large specimens consistently is not clear. However, the lithic material that was available to them is generally of mediocre quality for such a task. The microblades were predominantly of local volcanic origin with fine grained andesite (35.2%) and basalt (33.3%) being the most common. With the exception of very difficult to work quartz crystals (3.7%), sufficiently large pieces of cryptocrystalline material were not available in the area. However, partially metamorphosed andesite (12.0%) and rhyolite (11.1%) were used as fair substitutes. The only imported lithic material used for microblades consists of small amounts of obsidian (0.9%), chert (1.9%), and chalcedony (0.9%). Both crested blades are of obsidian, while five of the microblade cores are of basalt and two are of andesite. The predominant use of locally available lithic material supports the contention of local manufacture.

The W-1556 microblade cores are of two types. Six of them are subconical with the broad base of the cone being a dished striking platform created by the removal of a single

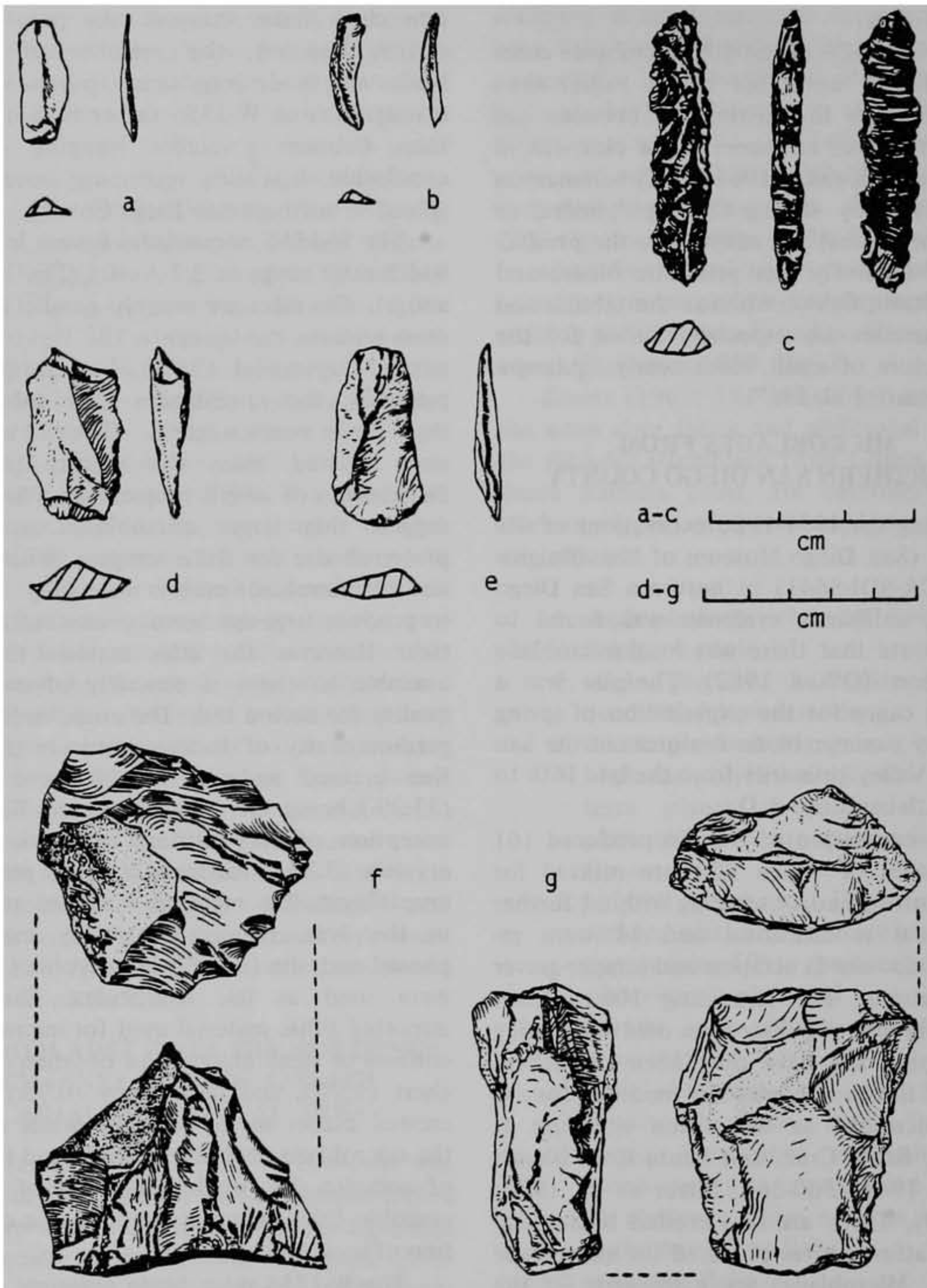

Fig. 1. W-1556 microblades (a, b, d, e), crested blade (c), and microblade cores (f, g).

Table 1
W-1556 MICROBLADE SIZE DISTRIBUTION

Size	Length (in cms.)	Width (in cms.)	Thickness (in cms.)	Nonutilized Microblades* (Percentage)	Flake Scrapers (Percentage)
A	1.6-2.0	.5- .8	.1-.3	51.9	0.0
B	2.2-2.9	.6-1.7	.2-.3	32.4	9.1
C	3.3-4.6	1.5-2.4	.3-.8	15.7	90.9

*The term "nonutilized" is employed here to refer to microblades that do not show evidence of having been retouched. They also lack abrasions or microflake scars from use as scrapers and/or knives.

large flake roughly perpendicular to the axis (Fig. 1f). Microblades, as well as more irregularly shaped flakes, were removed around the perimeter of the striking platform, running down the axis of the core toward the cone's apex. The majority of the microblade scars are 2.5-4.0 cm. long. One of the cores is of the second type. It has a flat, truncated subconical shape (Fig. 1g). Both ends have multifaceted striking platforms which allowed the bi-directional removal of microblades. Subsequently, the core was rotated 90° and smaller, irregularly shaped flakes were struck off by alternate percussion blows lateral to the cone axis. This latter pattern of flake removal resulted in a flattened, somewhat lenticular cross section for the core with two sinuous, longitudinal ridges on opposite edges. Perhaps, these two ridges were intended for crested blade removal. The longitudinal flake scars indicate that microblades 2.5-4.0 cm. long were produced from this core, as was the case with the simple subconical cores. However, none of the cores indicates that the knappers were proficient in this task. Not all of their attempts produced microblades and those that were produced lack uniformity. Step fracturing was a major problem, especially with the flat, truncated subconical core. Many (45.9%) of the microblades have collapsed distal ends characteristic of step fractures (Fig. 1d). This was particularly a problem for the middle size microblades (i.e., size B from Table 1). A few (3.7%) of the microblades have rounded, blunt distal ends resulting from hinge fractures (Fig. 1e). It is possible that the W-1556 assemblage contains other microblade core types, especially of the flake or small tabular sort identified by Kowta. However, none of the remaining 527 irregular cores and core fragments clearly exhibits prepared striking platforms or microblade flake scars. Furthermore, very few of the microblades have the equiangular cross section characteristic of blades struck from flake and tabular cores.

With the exception of the flat, truncated subconical type, the W-1556 microblade cores are quite similar to the ones described from the northern Channel Islands. In both cases subconical cores with single striking platforms predominate. The microblade core technology at SBA-60 is similar, but utilized more multiple striking platforms (ca. 65%) and more varied core shapes (Kowta 1961: 352-358). How many of these differences are artifacts of analysis is not clear, especially in the case of the flake type cores. However, the similarities between the Santa Barbara (i.e., SBA-60) and northern Channel Island microblades on the one hand, and those of northern San Diego County on the other, are striking.

The microblades, microblade cores, and crested blades from W-1556 were concentrated mainly in five combination cooking hearth and lithic workshop areas. Associated with the microblades were the majority of the other lithic tool manufacture and repair-related artifacts including irregularly shaped chipping waste, core remnants, hammerstones, and laterally snapped projectile points. In addition, these same areas had the highest concentrations of artifacts related to food preparation (e.g., manos, metates, boiling stones, and pot sherds). Food refuse bones and mollusk shells were also found in high frequencies around the hearth areas. This association of microblades, microblade cores and crested blades with everyday activities at

W-1556 is partially contrary to the findings for the northern Channel Islands. Swartz (1960: 406) hypothesizes that most of the microblades in that area were nonutilitarian burial offerings since (1) they were frequently discovered in cemetery caches, (2) they rarely exhibit edge wear, and (3) there is an absence of hafting evidence. As noted previously, a significant utilitarian use for the microblades at SBA-60, Santa Rosa, and Santa Cruz Islands was, in fact, as blanks for microdrill production. Pitzer et al. (1974: 127) report that on Santa Cruz and Santa Rosa Islands, crested blades also were most often found in mortuary contexts and that many were covered with hematite. They further speculate that some of the cores were mortuary items as well.

The time range for microblade technology in southern California has only been roughly identified. Pitzer et al. (1974: 134) speculate that within the northern Channel Island area they were made for as long as 2000 years ending in the first quarter of the 19th century. The microblades from SBA-60 are very likely from the late prehistoric and early historic periods since the site contained glass trade beads (McKusick 1961: 341). Swartz (1960: 406) suggests that microblades may be a reliable late Canaliño time marker.

The tentative time frame at W-1556 was most likely ca. A.D. 1350-1800. Obsidian hydration readings were taken from both of the crested blades. The first specimen was visually identified as coming from from Obsidian Butte, south of the Salton Sea. Using Paul Chace's (personal communication 1981) suggested hydration rate for that source (i.e., $t = 47d^2$ where t = years since hydration began and d = thickness of the hydration layer in microns), the 2.2±0.2 microns reading equates to A.D. 1752 with an error factor time range of A.D. 1709-1792. The second specimen was visually identified as coming from the Coso Mountain Range in Inyo County. Using Chace's suggested hydration rate for that source (i.e., $t = 38d^2$), the 3.9±0.2 microns reading equates to A.D. 1403 with an error factor time range of A.D. 1342-1461. Two radiocarbon dates from W-1556 hearth charcoal samples physically associated with microblades fall within the same time range. They were 285±110 (I-10,626) radiocarbon years (A.D. 1665) and 385±75 (I-10,627) radiocarbon years (A.D. 1565). Also associated with the hearth areas were six types of glass trade beads dated ca. A.D. 1769-1816 (O'Neil 1982: 125). Admittedly, the suggested time range of ca. A.D. 1350-1800 for microblade manufacture at W-1556 is based on limited data. Seven other obsidian hydration readings and typological evidence not physically associated with the microblade manufacturing point to the site being occupied intermittently from 2-3000 B.C. to as late as A.D. 1820 (O'Neil 1982: 115-131). However, nothing conclusively points to microblades being produced before ca. A.D. 1350 or after ca. A.D. 1800.

SUMMARY AND EVALUATION

The manufacture and use of microblades in southern California during the late prehistoric period and possibly earlier is beyond question. Previously, our knowledge of the distribution of this technology limited it to the northern Channel Islands and the Santa Barbara coast. Evidence presented here tends to indicate that the technology also existed at the same time in northern San Diego County. However, none of the southern California microblade data demonstrate a highly developed, intensive tradition comparable to those of Upper Paleolithic Europe.

Microblades, blade cores, and crested blades from W-1556 are generally similar in form but not in function to those from sites further north. The W-1556 microblades were used as scrapers, knives, and gravers. Those from the northern Channel Islands and

SBA-60 functioned mostly as microdrills and mortuary offerings. The lithic materials used in microblade production were, in both areas, usually the best locally available for flaking—fine grained andesites and basalts at W-1556, and Franciscan and/or Monterey cherts in the northern Channel Islands and on the adjacent coast (Pitzer et al. 1974: 125; Kowta 1961: 352-360).

In the 160-170 miles between Santa Barbara and northern San Diego County, there are some sketchy archaeological accounts of microblades and platform cores (Cottrell and Del Chario 1984: 60-61; Crabtree et al. 1963: 340, Pl. 5w; King 1962: 97; King 1967: 49, Fig. 16 1-p; McKusick and Warren 1959: 142-143; and Susia 1962: 166, Pl. 9o-v). There are also a number of site reports for this intermediate area that define a blade as a large projectile point or a knife (Greenwood and Browne 1963: 474, Pl. 2d; Harrison and Harrison 1966: 18-19; and Meighan 1959: 388-389). In some cases, the term blade is used in site reports without defining it (Craib 1982: 31 and Owen et al. 1964: 442). This common confusion of form and function terms along with incomplete descriptions makes it difficult to sort out the existing data. Greatly adding to the problem is the fact that most of the site reports written in southern California since 1975 are hard-to-obtain unpublished environmental impact reports. Therefore, this author hesitates to state that there was prehistoric knowledge of microblade technology in Orange, Los Angeles and southern Ventura counties. More conclusive data will very likely be found once most archaeologists begin to search for the morphological features related to the microblade manufacturing process.

In addition to defining the geographic distribution of microblades in southern California, there is the question of the historical relationship, if any, between the microblades of the Santa Barbara area and those of northern San Diego County. Did the technology diffuse north, south, west, or was there independent invention in each area? Inconclusive, though tantalizing, evidence supporting a southward diffusion hypothesis comes from the W-1556 assemblage. There were five pieces of chipping waste made from fused shale that originated in Grimms Canyon near Fillmore in Ventura County (Clay Singer, personal communication 1981). Also supporting a southward diffusion is the fact that microblades are far more abundant and generally more uniformly long and narrow in Santa Barbara area sites.

Twenty-four years ago, the existing data led Swartz (1960: 406) to state that "blade manufacture appears to be restricted to areas ethnographically inhabited by the Chumash." As demonstrated here, Swartz was premature in defining the distribution so narrowly. While it is now reasonable to say that microblades were also made in Luiseño and/or Ipai Digueño territory, it would be likewise premature on the basis of evidence presented here to state that other late prehistoric peoples in southern California did or did not have the technology. This report should be viewed as another beginning step rather than a definitive conclusion of microblade research in the region.

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